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IS 11338 (1985): Thermostats for Use in Refrigerators, Air Conditioners, Water Coolers and Beverage Coolers [MED 3: Refrigeration and Air Conditioning]

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IS : 11338 - 1985

(Reaffirmed 1999)

Indian Standard

SPECIFICATION FOR THERMOSTATS FOR USE IN REFRIGERATORS, AIR CONDITIONERS, WATER COOLERS AND BEVERAGE COOLERS

1. Scope — Covers evaporator thermostats with capillary type remote sensors, for use with refrigerators, air conditioners, water coolers, beverage coolers, etc. These thermostats are intended for use on ac circuits only, at voltage not exceeding 250 V, at current ratings not exceeding 25 A and cover a temperature range from −30°C to +30°C.

2. Terminology

2.1 *Thermostats* — A device intended for the automatic control of temperatures within specified limits.

2.2 *Range* — Difference between the minimum and maximum cut-out temperatures within which a thermostat operates.

2.3 *Cut-out Temperature* — The temperature at which the electrical circuit of the appliance is switched off.

2.4 *Cut-in Temperature* — The temperature at which the thermostat closes (connects) the electrical circuit of the appliance.

2.5 *Differential* — The difference between the temperature at which the contacts open and the temperature at which they close for a particular position under the specified test conditions.

2.6 *Cold Position* – An extreme operating position for the range cam where cut-in and cut-out temperatures are the lowest.

2.7 *Warm Position* — An extreme operating position of the range cam where cut-in and cut-out temperatures are the highest.

2.8 *Setting Position* – The position of the range cam at which the calibration of the thermostat is done. This should be specified as warm, middle and cold or any other position.

2.9 *Remote Sensor* - A thermostatic element which has a charge of sensing substance and works with a modulating effect.

2.10 *Capillary* — A small diameter tube used for connecting the remote sensor and the expansion device, say bellows, diaphragm etc.

2.11 *Defrost Mechanism* — The provision incorporated in thermostat used in refrigerating systems for defrosting the evaporator coils. If this mechanism is semi-automatic, it is operated manually when frost built up by the freezer section of the refrigerating system is excessive. After the freezer section is defrosted the refrigeration cycle starts automatically. If this mechanism is automatic, the defrost mechanism starts and stops automatically without manual operation at any stage.

2.12 *Frost Free Thermostat* (*Constant cut-in Thermostats*) – In this thermostat, cut-in temperature is fixed adove 0°C and it remains constant at all settings.

3. Rating

3.1 *Rated Voltage* — The highest rated voltage shall be 240 V ±10 percent for single phase 50 Hz, the preferred voltage being 230 V. If the preferred voltage is changed, the highest rated voltage shall be V preferred +10 percent of V preferred.

3.2 *Rated Current* — The current rating shall not exceed 25 A.

4. Construction

4.1 The method of mounting of thermostat by means of holes, and the hole distance shall be as agreed to between the purchaser and the supplier.

Refrigeration and Air Conditioning Sectional Committee, EDC 66; Air Conditioning and Refrigeration Appliances and Commercial Refrigerators Subcommittee, EDC 66 : 1
[Ref : Doc : EDC 66 (3354)]

Adopted 25 June 1985

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4.2 The capillary shall be of adequate length to enable correct fitment of sensor at the desired position of the evaporator. The length of the capillary shall not include the length of the sensor. The capillary shall be positively clamped with the bellows or diaphragm so that when the capillary is pulled, the joint at the diaphragm or bellows is not affected.

5. Material

5.1 *Material of Working Parts* — The material used in the manufacture of working parts of the thermostats shall be of such quality that they are durable under conditions prevailing in the country and stand all the tests specified in this standard.

6. General and Safety Requirements

6.1 *Electrical Insulation Under Normal Operating Conditions* — The leakage current which may flow from live parts to the accessible metal parts shall not exceed 300 μA (peak) or 210 μA (rms).

6.2 *Provision for Earthing* — Accessible metal parts which may become live in the event of an insulation fault, shall be permanently and reliably connected to an earthing terminal within the appliance.

6.3 *Moisture Resistance* – The enclosure shall provide protection to internal electrical contacts against moisture.

6.4 *Resistance to Rusting* – Ferrous parts, the rusting of which might cause the appliance to become unsafe shall be adequately protected against rusting.

6.5 In general, the safety requirements given in IS : 302-1979 'General and safety requirements for household and similar electrical appliance (*fifth revision*)' may also be referred to.

7. Marking and Stamping

7.1 The following information shall be marked on the outer surface of the thermostat which should be permanent:

a) Name or registered trade-mark of manufacturer;

b) Type number, serial number and model number, if any;

c) Rated voltage and current in volts and amperes respectively;

d) The word ' ac only '; and

e) Country of manufacture.

7.2 *Marking of Earth Terminal* — The symbol ⏚ shall be marked on or adjacent to earth terminal, when such terminal is provided.

8. Acceptance Tests

8.1 *Preparation of Sample* — Ten samples of thermostats of the same type and rating shall be selected at random from regular production line.

8.2 *Visual Examination and Inspection* — The thermostats shall be visually examined and inspected for general constructional and marking requirements specified in this standard.

8.3 *Operation Under Overload Conditions* — The thermostat shall be so designed that it withstands overloads liable to occur in normal use. The thermostat shall be loaded with 1·25 times the rated current at 1·1 times the rated voltage and operated for 200 cycles of make and break at a rate of 4 cycles per minute. During this test there shall be no sustained arcing and the contacts shall not have deteriorated appreciably.

8.4 *Dielectric Withstand Test* — No flashover or breakdown shall occur on application of an alternating voltage of 1 000 volts for a minute between the line and load terminals. During the test, supplementary insulation may be placed between the thermostat contacts and there shall be no breakdown either through or across the insulating material supporting the contact and terminal assemblies.

8.5 *Frame and Enclosure* — The thermostat shall be so formed and assembled that it will have the strength and rigidity necessary to resist the abuse to which it may be subjected, without increasing its fire hazard due to total or partial collapse with resulting reduction of spacings, loosening or displacement of parts, or other serious defects.

8.6 *Endurance and Life Test* — The capillary of the thermostat shall be cut near the sensing element to remove the charge. It shall then be pneumatically operated at pressures corresponding to the warmest cut off cut-in setting related to the charged gas at a frequency of 250 cycles/hour for a total of 0·1 million cycles. There shall be no mechanical failure of any part of the thermostat at the end of the life test.

8.7 *Drop Test* — The thermostat shall be freely dropped three times vertically from a height of 1·25 metres over a cement concrete floor.

8.7.1 The thermostat shall suffer no breakage or cracks.

8.7.2 There shall be no internal displacement and functional impairment.

8.8 *Calibration Test* — The calibration test shall be repeated as given in Appendix A. The results shall be within tolerance range as given in **8.8.1, 8.8.2** and **8.8.3.**

8.8.1 *At setting position* — The cut-out and cut-in temperature readings as observed in **A-2** shall be within the customer's specifications.

8.8.2 *At other positions* — The cut-out and cut-in temperature readings as observed in **A-2** shall be within the customer's specifications.

8.8.3 At the middle set point, the differential shall not exceed the following maximum limits:

a) Air conditioners	3·5°C
b) Refrigerators	14°C
c) Water coolers and beverage coolers	5°C

9. Criteria for Acceptance — All the samples shall successfull pass all the tests and fulfil all the general and safety requirements detailed in **6** and **7** respectively. If any of the samples fails in any of the acceptance test, the testing authority at its discretion, may call for fresh samples not exceeding twice the original number and subject them again to all the tests in which the failure occured. No failure shall be permitted in the report test(s).

10. ISI Certification Marking — Details available with the Indian Standards Institution.

APPENDIX A

(*Clause* 8.8)

CALIBRATION TEST

A-1. Test Equipment — Inspection of thermostats is carried in a cold bath which is a part of refrigeration unit. It has a control unit for regulating the rate of heating and cooling. A thermometer with a least count of 0·1°C is also mounted in the bath to take temperature readings. The bath is normally filled with methylated spirit or any other liquid which does not freeze or boil within the operating range of the thermostat under test. Liquid in the bath should be well stirred so that we have a uniform temperature throughout, maximum variation being ±0·1°C.

A-2. Procedure

A-2.1 The capillary of the thermostat must be dipped a minimum of 18 cm in cold bath liquid for correct temperature sensing. When sensing bulb is provided the bulb shall be fully dipped in cold bath liquid.

A-2.2 The rate of rise/fall of bath temperature shall not exceed 0·5°C/minute.

A-2.3 The cut-out and cut-in temperatures are first checked in setting position and subsequently in any other positions.

A-2.4 Checking of cut-in and cut-out temperatures shall be repeated thrice in each position. Only the final reading shall count.

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